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1902

Fifteenth Annual Report of the Agricultural Experiment Station of the University of Tennessee for 1902

University of Tennessee Agricultural Experiment Station

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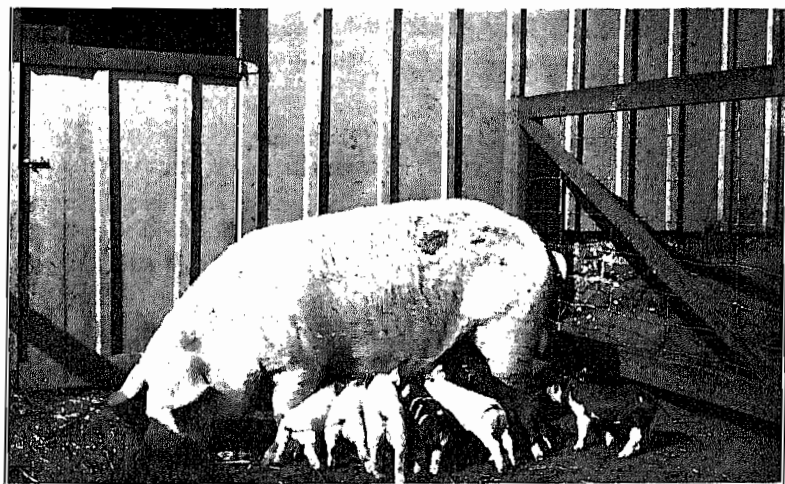
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FIFTEENTH ANNUAL REPORT
OF THE
Agricultural Experiment Station
OF THE
UNIVERSITY OF TENNESSEE
FOR 1902



BREAKFAST FOR EIGHT

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1902

THE AGRICULTURAL EXPERIMENT STATION

OF THE UNIVERSITY OF TENNESSEE

CHARLES W. DABNEY, *President and Director*

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PHARES O. VANATTER, Assistant for Plat Work
SAMUEL E. BARNES, Dairyman
FREDERICK H. BROOME, Librarian
MISS ETHEL REESE, Stenographer

The station has facilities for analyzing and testing fertilizers, cattle foods, milk and dairy products; seeds with reference to their purity or germinating power; for identifying grasses and weeds, and studying forage plants; for investigating the diseases of fruits and fruit trees, grains and other useful plants.

Packages by express, to receive attention, should be prepaid.

All communications should be addressed to the

AGRICULTURAL EXPERIMENT STATION,

Knoxville, Tennessee.

~~RE~~The Experiment Station building, containing its offices, laboratories and museum, and the plant house and Horticultural department, are located on the University grounds, 15 minutes walk from the Custom House in Knoxville. The experiment farm, dairy barn, stables, milk laboratory, etc., are located one mile west of the University, on the Kingston pike. The fruit farm is adjacent to the Industrial School, easily reached by the Middlebrook car line. Farmers are cordially invited to visit the buildings and experimental grounds.

Bulletins of this Station will be sent, upon application, free of charge, to any farmer in the state.

REPORT OF THE AGRICULTURAL EXPERIMENT STA-
TION OF THE UNIVERSITY OF TENNESSEE
FOR 1902

REPORT OF THE VICE-DIRECTOR AND
AGRICULTURIST

To President Charles W. Dabney:

The work in the Agricultural department comprises three divisions: Work in animal husbandry; work in dairy husbandry; plat and field investigations with the crops of the farm.

You may be interested to know that in three years the plat system of the Station has been increased from some 200 to more than 900 plats and the area of land employed from four to twenty acres. The number of animals maintained on the farm for the purpose of labor and feeding trials have increased from 50 to 150. In the first experiment with beef cattle there were eight animals; the present year there are 32. In the first investigations with hogs there were 12 animals; in the present, 50. The dairy herd has increased from a total of 20 animals to a total of 45; while during the greater part of the past year all of our horses and mules have been on feeding trials with cotton seed meal. Three years ago to feed 50 head of cattle it was necessary to purchase a considerable amount of roughness. The present year the farm, reduced now to 60 or 70 acres of land, leaving out of consideration of course the land occupied by a small pasture, the plat work and the buildings, has produced all the roughness needed for the large number of stock now on the farm and some 500 bushels of corn and grain in addition.

ANIMAL HUSBANDRY

Feeding experiments have been conducted with horses, beef cattle and hogs during the year just closed. An attempt was made to replace part of the corn ration ordinarily fed horses and mules by cotton seed meal, but with only partial success.

The three years' feeding trials with native cattle were concluded and the results published in bulletin No. 3, Vol. XV. Another line of investigation was begun with a better class of cattle

to determine the value of cotton seed meal by itself and in combination with other meals for beef production.

A cooperative experiment with J. H. and G. H. Strong of McMillans is in progress to ascertain the best roughage to use with stock cattle that are to be finished on grass. The roughage used is silage, corn stover, sorghum fodder and Kafir corn fodder. A small barn was built during the late autumn which provides much needed room for housing the cattle and storing roughness.

An investigation relative to the utilization of skim milk in hog feeding was undertaken in January, 1902, and continued for 70 days. In December a duplicate experiment was begun with a larger number of animals. The value and carrying capacity of different crops for hog pasture was commenced during the summer and crops have been seeded this fall for a continuation of this work next season. The pigs that were grazed during the summer were put on experiment in October to determine the relative value of corn, barley and rye meal in pork production.

On the farm the production of hay from cereals and legumes, green feed for soiling, and silage crops has been continued. The scope of the investigation with silage crops has been materially widened. A number of different crops were also grown and siloed for digestion experiments, while a combination of these several crops was grown in rows of different widths to discover which method of planting would yield the largest amount of nutrients per acre.

PLAT WORK

About twenty acres of land comprising three distinct soil types are devoted to field experiments. The investigations are being conducted along three different lines: First, with forage crops; second, with winter cereals; and third, with grasses and clovers.

The work with forage crops includes variety tests with corn, cowpeas, sorghum, soy beans and millet. A study is being made of the comparative value of northern and southern grown corn for grain and silage production; also the best varieties of cowpeas for growing among early and late varieties of corn and sorghum for the purpose of increasing the protein content of silage from these crops. The importance of determining those varieties of corn and other forage crops adapted to the different soil types of the state is apparent to all, and so this work is being given special

attention. Already it has been found that Hickory King is best suited to upland soils of medium quality; Cocke's Prolific to a better quality of upland soils; and Huffman for rich river and creek bottoms.

The Whippoorwill pea is well adapted for growing among early corn or sorghum for silage, though it does not climb so well as the Lady, but as the latter is a late maturing variety, it will give its best results when sown with the late maturing varieties of corn and sorghum.

The soy bean has made a yield of 25 to 30 bushels of threshed grain and as it contains more than three times as much digestible protein as a pound of corn, its value to the stock feeder will be apparent at once. They stand drought better than cowpeas and do not shell out and grow in the pod as badly in a wet season. They occupy the ground the whole season, however, and are not well adapted for growth as a catch crop.

Extensive experiments are in progress with all the leading winter cereals. If put on good ground and seeded early in the fall so as to enable them to make a strong root growth, they produce fine crops of grain or hay as desired. The Station has found that winter wheats grown in Tennessee possess excellent milling qualities, much better in fact than have been accorded them in the past. This is a very important discovery and will doubtless ultimately result in a large increase in acreage of wheat and a better price for the product.

The work having in view a determination of the best mixtures of grasses and clovers for hay and pasture is still in progress. The work is being conducted on a very poor cherty hillside and to date it does not seem that any mixture of grass will prove superior to orchard grass alone on this kind of soil. Probably the best mixture discovered so far for well prepared upland soils, liberally supplied with barnyard manure or humus in the form of green crops, is orchard grass, tall oat grass, meadow fescue, red top, alsike and red clover. The seeding should be done either in the early fall, about the first of September, or in the spring, about the first of March. Common red clover will do fairly well on poor, upland soils when seeded after cowpeas plowed under. The principal thing needed in this class of soils to make them valuable for grazing or hay production is an increase of fertility through the application of farmyard manure or the plowing down of green crops. If these results can be obtained on a

soil of such indifferent quality and under adverse conditions, there is no reason why good pastures and meadows should not be available on all the better farming lands of the state.

DAIRY HUSBANDRY

The experiment to determine the relative values of cotton seed meal, cowpea hay and wheat bran was completed and published as bulletin No. 4, Vol. XV. Another experiment has been undertaken to ascertain the relative feeding values of cotton seed meal and wheat bran alone as compared with a mixture of the two. This experiment is still in progress. An experiment to compare the relative feeding values of silage made from corn; sorghum; sorghum and peas; corn, sorghum and peas; and sorghum and velvet beans has been carried on throughout the year, resulting in the discovery of some interesting facts.

The dairy herd is in excellent condition and during the year the 25 cows averaged over 5,000 pounds of milk and 297 pounds of butter each. There has been no sickness in the herd with the exception of one case of milk fever. The Schmitt treatment was followed and the cow saved, though in our experience the treatment impairs the future value of the cow to some extent. The major portion of the herd now consists of pure bred animals, the Jesrey type and blood predominating. At the present time there are 25 cows and during the coming year there will be 30 in milk all the time. A good many of these animals are of our own breeding and some of them show evidence of exceptional merit. There are 16 young heifers in the herd, besides two sires, so that our dairy herd at the present day consists of some 47 animals, young calves of course included. The herd has thus more than doubled in numbers within three years, while the material increase in the value of the individuals is a source of the greatest satisfaction.

These results speak for themselves and show that some progress has been made along the several lines indicated and some very useful facts discovered, first of scientific value, and second, of intensely practical value to the people of the state.

The Horticultural department has increased its fruit plantations very considerably and added otherwise to its material equipment. Preliminary investigations with truck farming are now in progress which will doubtless result in solving many difficult problems which now beset the path of the truck grower. The trucking industry of the state is growing very rapidly and these

investigations will be of great value to those interested in truck farming. The record of the orchard from its inception to fruit production constitutes a unique and valuable feature of the investigations in this department and is furnishing data of special importance to the rapidly increasing horticultural interests of the state.

It is hard to estimate the value of the recent discoveries made and published in the bulletin on "The Action of Copper on Leaves" by the Botanical department. It has not been definitely demonstrated as yet that all the theoretical propositions in the bulletin are practical, but there is every reason to believe that they are, and this season will see the work tested so thoroughly as to establish its value beyond a doubt.

The Chemical department has continued its work on soils. Interesting data are being accumulated, though the progress, because of the laborious and time-consuming nature of the work, must be slow.

The investigation into the chemical properties of wheat, being conducted in conjunction with the Agricultural department, promises to give results of the highest value and to establish the status of the Middle South as a wheat producing section. It is the belief of those engaged in the work that this section has been unwarrantably maligned by persons who were not familiar with its capabilities or the quality of the grain the soil and climate enable the farmer to produce.

Cooperative investigations looking to the improvement and introduction of new and valuable cereals and grasses and forage plants are now in progress with the Bureau of Plant Industry, U. S. Department of Agriculture. The work of the past year has progressed harmoniously and promises to enable all the parties interested to discover and arrange systematic information concerning the important topics mentioned with more expedition and satisfaction than where the experiments are conducted independently. It is very desirable that the present cooperative agreement be maintained because of the value of the results it will enable the several departments to obtain and because of the helpful association and spirit of cooperation it engenders between the workers, a matter of much greater moment than one would think at first sight.

The librarian's report shows that some valuable additions are being made to the library each year and that this very necessary

part of the equipment of the Station is being given due consideration.

During the past year the following bulletins were issued by the Station and published first separately and later in book form, as Volume XIV of the Station reports:

The Value of Corn, Skim Milk and Whey for Fattening Swine, Andrew M. Soule and John R. Fain.

The Action of Copper on Leaves, Samuel M. Bain.

Feeding Native Steers, Andrew M. Soule and John R. Fain.

The Relative Value of Protein in Cotton Seed Meal, Cowpea Hay and Wheat Bran, Andrew M. Soule and S. E. Barnes.

One annual report.

The mailing list is increasing very rapidly and it is already difficult for the Station with its limited financial resources to meet the demand for its publications. The call for reading matter indicates that the farmers are giving greater heed to the Station's work than ever before. In other words, a large per cent of the farming population have come to recognize the Station as a source of help and a medium through which they can obtain reliable information. They are coming rapidly to appreciate the value of correct information relating to their soil and to the production of many crops.

That the Station is growing in favor is also indicated by the large increase in its correspondence. In fact it has become so heavy as to entail a very considerable burden, though cheerfully borne by all members of the staff. It is a knowledge of such facts that encourages our workers and makes them feel that their efforts are being of real service to the people of the state.

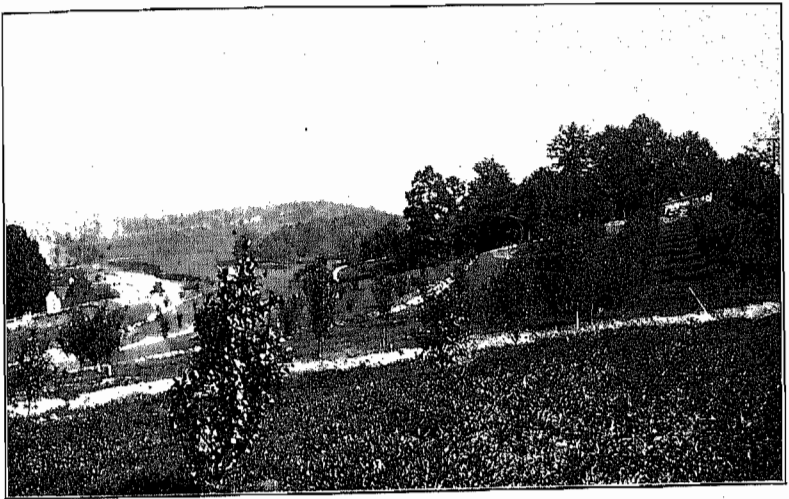
Nearly all members of the staff were engaged more or less extensively in institute work the past year. Meetings were held at Blountville, Jonesboro, Maryville, Rogersville, Henderson, Selmer, Savannah, Morristown, Jackson, Greeneville, Jefferson City, Clinton, Lebanon, Sweetwater, Dayton, Johnson City, Athens, Harriman, Pulaski, Dickson and Cookeville; some of them independently and some of them in conjunction with the office of Commissioner of Agriculture. During the past three years the members of the staff have delivered addresses before fully 40,000 Tennessee farmers. The farmers' institute is a great factor in the education of the people of the rural districts and should be encouraged in every way. While it makes a considerable draft on the time of the Station worker, it enables him to get his results

before the people in the most graphic way and to teach them to appreciate the work of the Station more fully.

In conclusion, permit me to thank you for your kindly consideration of my efforts and for your excellent advice and helpful suggestions on all occasions. I also desire to thank personally each and every member of the staff, and especially my own personal assistants for the faithful services rendered during the past year, without which it would have been impossible to accomplish anything of value.

Very respectfully,

ANDREW M. SOULE,
Vice-Director and Agriculturist.



VIEW ON UNIVERSITY FRUIT FARM

REPORT OF THE BOTANIST

During the year 1902, the greater part of the work done by me as botanist of the Experiment Station consisted in preparing the matter for Bulletin No. 2, Vol. XV., "The Action of Copper on Leaves." This publication includes results of investigations covering a period of several years, which had in view the possible discovery of a method for spraying peach trees so as to prevent such diseases as the brown rot and at the same time to prevent the injury to the sensitive foliage of this tree. It is needless here to enter into further details as to the results of this investigation, since they are fully discussed in the bulletin in question. This publication was necessarily purely technical, and it was thought unwise to mail it to other than scientific men. The results, however, give some promise of important practical application, and a full series of field experiments are planned for the season of 1903. It is hoped that some definite and tangible practical results may then be obtained, after which a popular bulletin will be prepared recounting all these results which have a practical bearing on the treatment of these diseases.

In addition to this practical field work, a few more features of the physiological problems suggested in the course of the investigation give promise of some important results, and it is hoped to accomplish something along this line also during the approaching season.

Among several minor accessions to the equipment of this department may be mentioned the completion of the library set of the *Revue générale de Botanique*. This now supplies the Station library with complete files of all the more important botanical reviews, and furnishes means for discovering all the later literature bearing on any line of botanical investigation.

Plans are being made for the prosecution of other important lines of investigation in the near future, and the outlook for the department is encouraging, provided proper support can be given it.

Respectfully submitted,

SAMUEL M. BAIN, *Botanist*.

REPORT OF THE HORTICULTURIST

The experiment orchard has made good growth during the past season, and is now in very satisfactory condition, except that a few trees are infested with San Jose scale.

Last year the scale was discovered in the orchard, and submitted readily to the "kerowater" treatment. Very careful examination two months after the trees were treated failed to disclose the insect anywhere in the orchard. But it is prevalent in nearby trees, so that renewed infection was not surprising. A few peach trees and pear trees now show the scale, but in none has it become so bad as to cover the bark anywhere. During February the orchard will be thoroughly sprayed with a twenty per cent. solu-

tion of crude petroleum with the "kerowater" spray-pump, this treatment having proved effective last year.

Over 40 varieties have been added to the test plats of strawberries, and an experiment with commercial fertilizers for strawberries is in progress. Results can not be determined until the crop is harvested the coming season.

The experiment vineyard, which was planted in newly cleared ground last year and made poor growth, was deep-plowed and well cultivated throughout the season, resulting in vigorous growth of the young vines. Trellises were set for testing various systems of pruning and training the grape, and the vineyard will be used the coming season in a fertilizer test for grapes.

The test of tobacco dust as a remedy for the woolly aphis of the apple warrants its use on newly planted trees. No aphis was seen on trees set last spring with a covering of tobacco dust one inch deep next their roots, and very little was seen in trees set two years ago that were treated with tobacco dust last spring. The insect was very bad on small hawthorn trees growing wild in the woods near the orchard, and was quite prevalent in an untreated nursery row of apple trees.

A preliminary experiment in the use of fertilizers for vegetables gave results which will form the basis for more extended experiments of a similar nature to be inaugurated the coming spring.

The equipment of the department has been improved by the purchase of material for a small forcing house, which it is hoped will be ready for use early in the present year.

The increasing correspondence of the department indicates a growing public appreciation of work done, while the steady progress made gives promise of increasing usefulness in the future.

Respectfully submitted,

CHARLES A. KEFFER, *Horticulturist*.

REPORT OF THE CHEMIST

The work on the type soils begun three years ago by this department has been continued to the present time. A part of the investigation has been in the field, carrying out fertilizer experiments on different type soils. Another part has been the making of chemical analyses of the different soils. A practical report on the fertilizer experiments is being prepared for early publication. The present plan is to make a complete report some time in the future when enough work has been done to make the report more comprehensive and complete than can be made at present. This line of investigation is thought to be the most important which can now be undertaken by the Chemical department. No special results have been obtained this season other than those already reviewed in previous articles. Anyone desiring a general resume of the results is referred to the Annual Report for 1901.

Fertilizer experiments in galvanized iron pots—a new line of work which naturally grew out of the soil investigations—were carried on with

fairly satisfactory results during the past season. Pot experiments are considered by the chemist to be of much practical value to this state. In fact, only by chemical work in the laboratory and by pot experiments under controllable conditions, can many of the soils be tested in a satisfactory manner, in particular those which are in distant parts of the state. Co-operative field experiments have not been satisfactory except when personal supervision could be given. The limited appropriation which could be used in this way made personal supervision impossible save in the immediate vicinity of Knoxville. The principal problem undertaken in the pot experiments was to determine the relative values of phosphoric acid from different commercial sources, with special reference to our conditions. The crops grown were cowpeas, wheat, clover, and turnips. This problem merits further investigation, and facilities for carrying out this work in a proper manner are greatly desired. There is a probability, judging from the chemical analyses, that some of our soils contain a harmful excess of magnesia. This problem can be investigated more easily by means of pot cultures than in any other way, and a few experiments on this subject are being made.

In cooperation with the Agricultural department, a chemical investigation has been recently undertaken on Tennessee wheats. The prime objects are, first, to compare the composition of different varieties of wheat grown on different type soils and under different systems of fertilization, and, second, to determine the effects of this climate on the composition of wheat. The results so far have been of a highly interesting and attractive character. A tendency of the climate seems to be to produce wheat high in protein and hence in gluten, the most nutritious and valuable constituent. The analysis of one variety in particular shows it to be higher in protein than any wheat grown elsewhere in the United States. If this high protein content is found to be a permanent characteristic, this wheat would be of much commercial importance to the entire state.

Another line of work recently undertaken is digestion experiments with sheep. No digestion experiments have been reported for a number of crops which are of great value in the South. The present experiments are being made with different kinds of ensilage.

As heretofore, quite a variety of miscellaneous laboratory work has been done. Minerals and mineral waters have been received from different parts of the state, and qualitative examinations made free of charge. The following is a general summary of the analytical work for the past year :

	Number of analyses.
Feeding stuffs	11
Wheats	86
Soils	19
Fertilizers	10
Mineral waters	8
Minerals	52

Respectfully submitted,

CHAS. A. MOOERS, *Chemist.*

REPORT OF THE VETERINARIAN

The work on veterinary science in connection with the Experiment Station did not differ very materially from that of last year, it being carried on mostly in the form of correspondence. There were several pathological specimens sent to the Station for examination in order to determine the nature of some disease among the live stock in different sections of the state, but very little could be done in that line, there being no facilities for pathological or bacteriological investigations.

Respectfully submitted,

M. JACOB, *Veterinarian.*

REPORT OF THE LIBRARIAN

There are on the shelves of the library at the end of the year 2,400 bound volumes, not counting over two hundred duplicate reports of various institutions. Of this number, 88 volumes obtained by subscription were bound during the year, and 75 were donated or purchased. The journals subscribed for are as follows: *American Gardening*, *Annales Agronomiques*, *Annals of Botany*, *Botanical Gazette*, *Botanischer Jahresbericht*, *Bulletin of the Torrey Botanical Club*, *Farm Implement News*, *Gardeners' Chronicle*, *Gardening Journal of the Chemical Society*, *Die Landwirtschaftlichen Versuchs-Stationen*, *Revue générale de Botanique*, *Zeitschrift für Pflanzenkrankheiten*, *Zeitschrift für Wissenschaftliche Mikroskopie*. In addition to these about one hundred periodicals have been received gratis, including a large number of the best agricultural papers. Some thousands of pamphlets are also on file.

Interest in the work of the Station continues to be manifested by increasing demands for its publications, and as a consequence the mailing list is rapidly growing. The addresses now number 10,555, and are distributed as follows:

Experiment stations and U. S. Dept. of Agr.	705
Tennessee newspapers	160
Exchanges	196
Residents of Tennessee	8,847
Other states	614
Foreign, other than exchanges	33
Total	10,555

An effort is made to comply with requests for literature as fully as possible. When the information asked is not contained in any of our own bulletins, it can often be found in bulletins of other stations, and extra copies of these are filed by subjects to be used on such occasions.

For the convenience of persons applying for publications the following list is given of those now available:

LIST OF AVAILABLE BULLETINS AND REPORTS

VOLUME I—1888

- No. 1 History and reorganization. Dehorning cattle.
- No. 2 The experiment station; building and laboratories; Germination of seed corn. Analyses of commercial fertilizers.
- No. 3 Weeds of the farm.
First annual report.

VOLUME II—1889

- No. 1 Notes on fertilizers and fertilizing materials.
- No. 4 Grasses of mountain meadows and deer parks. Chemical composition and tests of varieties of strawberries.
Second annual report.

VOLUME III—1890

- No. 4 Practical experiments in reclaiming "galled" or washed lands, with notes on mulch and mulch materials.
- No. 6 Index to Volumes I, II and III.
Third annual report.

VOLUME IV—1891

- No. 3 The true bugs, or heteroptera, of Tennessee.
- No. 4 Some fungous diseases of the grape.
- No. 5 A chemical study of the cotton plant.
Fourth annual report.

VOLUME V—1892

- No. 1 Fruit trees, and experiments with vegetables.
- No. 4 Experiments with fruit trees and vegetables.
Fifth annual report.

VOLUME VI—1893

Sixth annual report.

VOLUME VII—1894

Seventh annual report.

VOLUME VIII—1895

Eighth annual report.

VOLUME X—1897

- No. 2 Pot culture of lettuce.
- No. 3 The soils of Tennessee.
- No. 4 Scale insects: San Jose and other species.
Tenth annual report.

VOLUME XI—1898

- No. 2 Grasses and forage plants of the south: I Domesticated grasses.
- No. 3 Grasses and forage plants of the south: II Leguminous plants.
- No. 4 Grasses and forage plants of the south: III Meadows and wild pastures.
Eleventh annual report.

VOLUME XIII—1900

- No. 2 Experiments with winter wheat.
- No. 3 Fertilizer experiments on potatoes, corn, cowpeas, peanuts, and effects of fertilizers on the germination of seeds.
- No. 4 Feeding native steers.
Thirteenth annual report.

VOLUME XIV—1901

- No. 1 Experiments with corn, forage crops and spring cereals.
- No. 2 Winter wheat.
- No. 3 Winter cereals and legumes.
- No. 4 The early growth and training of apple trees.
Fourteenth annual report.

VOLUME XV—1902

- No. 1 The value of corn, skim milk and whey for fattening swine.
- No. 2 The action of copper on leaves.
- No. 3 Feeding native steers.
- No. 4 The relative value of protein in cotton seed meal, cowpea hay and wheat bran.
Fifteenth annual report.

PRESS BULLETINS

- No. 11 The fertilizer question.
- No. 12 Cowpea vine hay.
- No. 14 Grades on country roads.
- No. 15 Calf feeding.
- No. 16 Live stock problems.
- No. 17 Winter gardening. Winter violets.
- No. 18 Advantages of dairying.
- No. 19 Formulas for spraying mixtures.

Respectfully submitted,

FREDERICK H. BROOME, *Librarian.*

TREASURER'S REPORT

JULY 1, 1901, TO JULY 1, 1902

The Agricultural Experiment Station of the University of Tennessee

IN ACCOUNT WITH THE UNITED STATES.

	Dr.	Cr.
To unexpended balance on hand July 1, 1901	\$ 18 34	
July 5, to United States treasury draft, 1901	3,750 00	
Oct. 8, to United States treasury draft, 1901	3,750 00	
Jan. 6, to United States treasury draft, 1902	3,750 00	
April 5, to United States treasury draft, 1902	3,750 00	
By Salaries		\$ 7,646 67
Labor		3,908 27
Publications		897 19
Postage and stationery		293 48
Freight and express		39 05
Heat, light and water		287 10
Chemical supplies		101 80
Seeds, plants and sundry supplies		246 28
Fertilizers		80 60
Feeding stuffs		378 08
Library		267 96
Tools, implements and machinery		254 45
Scientific apparatus		141 78
Traveling expenses		148 83
Contingent expenses		158 15
Building and repairs		150 31
Balance		18 34
Totals	\$15,018 34	\$15,018 34

This is to certify, that, as the authorized Auditing Committee of the Board of Trustees of the University of Tennessee, we have examined the accounts of the Treasurer of the Agricultural Experiment Station for the fiscal year ending June 30, 1902, and find them correct; that the above is a true balance sheet corresponding with said accounts; that the said accounts show no more than \$150.31 was expended for building and repairs, and that there is \$18.34 cash balance.

(Signed)

EDWARD T. SANFORD,
HU L. McCLUNG,
JAMES MAYNARD,

Auditing Committee.

We hereby certify that Edward T. Sanford, Hu L. McClung and James Maynard are the authorized Auditing Committee of the Board of Trustees of the University of Tennessee.

CHARLES W. DABNEY,
President University of Tennessee.

J. W. GAUT,
Secretary Board of Trustees.

State of Tennessee, County of Knox.

Before me, Thos. D. Morris, a Notary Public in and for said State and County, personally appeared the foregoing signers, personally known to me to be trustees and officers of the University of Tennessee, who made oath, in due form of law, that the above statements are true to the best of their knowledge, information and belief.

Witness my hand and official seal at office in Knoxville, Tennessee, this 31 day of January, 1903.

(Seal)

THOS. D. MORRIS,
Notary Public.